REMARKS

Claims 1-16 are pending in the present application. By this reply, claims 9-16 have been added. Claims 1, 6-8 and 11 are independent claims.

The specification and claims have been revised slightly to correct minor informalities and to clarify the invention. These modifications do not add any new matter to the disclosure. A Drawing Change Approval Request (DCAR) is concurrently filed herewith. The Examiner's approval of the drawing corrections is respectfully requested.

IDS FILED ON JUNE 22, 1998

The Examiner requested a copy of Form PTO-1449 filed with the IDS on June 22, 1998. However, the two references (USPN 5,136,577 to Amano et al. and USPN 5,396,488 to Lahdemaki) cited on the Form PTO-1449 have already been considered by the Examiner and were cited by the Examiner on PTO-892. Accordingly, resubmission of the Form PTO-1449 is not needed.

ALLOWABLE SUBJECT MATTER

Claims 6-8 have been allowed over the prior art of record.

Claims 2-5 have been objected to as being dependent upon a rejected base claim, but will be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

35 U.S.C. § 102 REJECTION

Claim1 has been rejected under 35 U.S.C § 102(b) as being anticipated by Lahdemaki (U.S. Patent No. 5,396,488). This rejection, insofar as it pertains to the presently pending claims, is respectfully traversed.

The present embodied invention relates to an acoustic echo control system which is capable of improving telephone communication quality by suspending an operation of the adaptive echo remover in the double talk section. That is, the acoustic echo control system of the embodied invention is capable of improving telephone communication quality by intercepting the estimated echo signal generated from the adaptive echo remover.

Lahdemaki is directed to an echo canceller to remove the acoustic echoes and an NLP control unit 26 to shunt the non-linear processor (NLP) 27 during a double talk state and when the signal level L_{sin} received at the port S_{in} from the near end exceeds the suppression threshold level T_{SUP}. Lahdemaki discloses a control unit 22 which controls the operation, adaptation and updating of the adaptive filer 21 on the basis of the levels of the signals y(i) and x(i) (which levels are obtained by means of level detectors 24 and 25, respectively) and on the basis of a disable tone detection (which is performed by means of a disable tone detection circuitry 37). The adaptive digital filter 21 is for instance a digital transversal filter, which models an impulse response of the echo path.

However, Lahdemaki does not teach or disclose at least "a control unit suspending an operation of the adaptive echo remover in the double talk state in accordance with an output signal from the double talk detecting unit" as recited in claim 1. The apparatus and method for non-linear signal processing in an echo canceller as disclosed by Lahdemaki is not capable of improving telephone communication quality by suspending the operation of the adaptive echo remover in the double talk state, as in the claimed invention.

Accordingly, independent claim 1 is not anticipated by Lahdemaki, and reconsideration and withdrawal of the rejection based on these reasons is respectfully requested.

NEW CLAIMS

Independent claim 11 and its dependent claims 12-16 contain similar subject matter as claims 1-5. Thus, these new claims are believed to be allowable at least for the same reasons that claims 1-5 are allowable as discussed above.

Claims 9 and 10 are allowable since they depend from allowed claim 6.

CONCLUSION

For the foregoing reasons and in view of the above clarifying amendments, Applicant respectfully requests the Examiner to reconsider and

withdraw all of the objections and rejections of record, and earnestly solicits an early issuance of a Notice of Allowance.

Should there be any outstanding matters which need to be resolved in the present application, the Examiner is respectfully requested to contact Esther H. Chong (Registration No. 40,953) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and further replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Enclosures: Substitute Specification
Marked-Up Copy of Specification
Drawing Change Approval Request
Version with Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification

The specification has been replaced with the substitute specification attached hereto. A marked-up copy of the specification is also attached hereto.

In the Claims

The claims have been amended as follows:

2. (Amended) The system of claim 1, wherein the double talk detecting unit comprises:

a double talk detecting lattice prediction unit receiving a near end signal in which the near end talker signal is compounded with the echo signal as an input signal and computing a reflection coefficient variation which indicates a characteristic of a sound signal;

a threshold value determining lattice prediction unit receiving the near end signal and estimating a reflection coefficient variation with respect to the far end signal using the reflection coefficient variation of the sound signal, thereby computing a threshold value for the double talk detection; and

a double talk determining unit receiving and comparing output signals from the double talk detecting and threshold value determining [grid] lattice prediction units and accordingly determining the double talk state.

3. (Amended) The system of claim 2, wherein the reflection coefficient variation of the input signal is computed by an equation

$$D_r(n) = \frac{\sum_{i=1}^{\Gamma} [\, k_i(n) - k_i(n-T) \,]^2}{\sum_{i=1}^{\Gamma} [\, k_i(n) \,]^2} \times 100$$

wherein Γ is a degree in which there is a reflection coefficient having an effective value in the [grid] lattice prediction unit comprised of pth degree, K is a parameter indicating the characteristic of the voice signal, $K_i(n)$ is a reflection coefficient in a discrete time n and $K_i(n-T)$ is a reflection coefficient from a time n to a sample T.

5. (Amended) The system of claim 4, wherein γ is larger than 1 and [should be] is set up considering an echo signal-to-noise ratio.

6. (Amended) A double talk detector of an acoustic echo control system, the double talk detector comprising:

a double talk detecting [grid] lattice prediction unit receiving a near end signal in which a near end talker signal is compounded with an echo signal according to a far end signal from a far end talker as an input signal and

computing a reflection coefficient variation which indicates a characteristic of a sound signal;

a threshold value determining [grid] lattice prediction unit receiving the near end signal and estimating a reflection coefficient variation with respect to the far end signal using the reflection coefficient variation of the sound signal, thereby computing a threshold value for the double talk detection; and

a double talk determining unit receiving and comparing output signals from the double talk detecting and threshold value determining lattice prediction units and accordingly determining [the] a double talk state.

Claims 9-16 have been added.